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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,596	10/23/2003	Jonathan R. Howell	M1103.70114US00	3508
45840 7590 09/07/2007 WOLF GREENFIELD (Microsoft Corporation) C/O WOLF, GREENFIELD & SACKS, P.C. 600 ATLANTIC AVENUE BOSTON, MA 02210-2206			EXAMINER LAI, MICHAEL C	
			ART UNIT 2109	PAPER NUMBER
			MAIL DATE 09/07/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/694,596

Applicant(s)

HOWELL ET AL.

Examiner

Michael C. Lai

Art Unit

2143

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-2,4-7,12-16,21 is/are rejected.
- 7) ☒ Claim(s) 8-11 and 17-20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 3-14-05
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Priority*

This application has no priority claim made. The filing date is 10/23/2003. The claims were amended on 03/14/2005.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 4-7, 12-14, 16, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Mills ("Internet Time Synchronization: the Network Time Protocol", IEEE Trans. Communications 39, 10 (October 1991), pp. 1482-1493.), hereinafter referred to as Mills.

3. Regarding claims 1 and 2, Mills discloses a method for determining a bound around a reference time such that the reference time is determined to have occurred between a first bound limit and a second bound limit, the method comprising the steps of:

transmitting a protected reference time request to a higher level computing device, wherein the higher level computing device is a level closer to a reference time source [Figure 1 "Subnet Synchronization" and Section II, paragraph 3: Following conventions established by the telephone industry, the accuracy of each time server is defined by a number called the stratum, with the reference level (primary servers) assigned as one

Art Unit: 2143

and each succeeding level towards the leaves (secondary servers) assigned as one greater than the preceding level. Section III.B paragraph 3: While the multicast and procedure-call classes may suffice on LANs involving public time servers and perhaps many private workstation clients, the full generality of NTP requires distributed participation of a number of time servers arranged in a dynamically reconfigurable, hierarchically distributed configuration. This is the motivation for the symmetric modes (active and passive). By operating in these modes a server announces its willingness to synchronize to or be synchronized by a peer, depending on the peer-selection algorithm. Symmetric active mode is designed for use by servers operating near the leaves (high stratum levels) of the synchronization subnet and with pre-configured peer addresses.];

receiving a response from the higher level computing device, the response comprising a protected reference time source response, the reference time source response comprising the reference time, and a collection of protected reference time requests from each first level computing device that had transmitted the collection of protected reference time requests to the reference time source prior to the reference time [Section III.B paragraph 3: Symmetric passive mode is designed for use by servers operating near the root (low stratum levels) and with a relatively large number of peers on an possibly intermittent basis.];

setting the first bound limit at a transmittal time, when the protected reference time request was transmitted to the higher level computing device [Figure 3 "Measuring Delay and Offset", Ti-3 ]; and

setting the second bound limit at a receipt time when the response from the higher level computing device was received [Figure 3 "Measuring Delay and Offset", Ti-2].

4. Regarding claims 4 and 12, Mills further discloses wherein the reference time source is a distributed computing system implementing a Byzantine fault-tolerant consensus algorithm [Section I.C, paragraph 4: Current network clock synchronization techniques have evolved from both linear systems and Byzantine agreement methodologies.].

5. Regarding claims 5 and 13, Mills further discloses wherein the protected reference time request and the protected reference time source response are protected through the use of encryption [Section III.F, paragraph 4, lines 6-11: An authenticator, consisting of a key identifier and encrypted checksum, is computed using the DES encryption algorithm [9] and DES cipher block-chaining method [10]. Some implementations incorporate special provisions to compensate for the delays inherent in the encryption computations.].

6. Regarding claims 6 and 14, Mills inherently discloses wherein the protected reference time request and the protected reference time source response are protected through the use of a nonce [cryptographic nonce].

7. Regarding claims 7 and 16, Mills inherently discloses the steps of: receiving a second protected reference time request from a lower level computing device, wherein the lower level computing device is a level further from the reference time source; and incorporating the second protected reference time request into the protected reference time request prior to transmitting the protected reference time request to the higher level

Art Unit: 2143

computing device [Figure 1 "Subnet Synchronization" and Section II, paragraph 3:

Following conventions established by the telephone industry, the accuracy of each time server is defined by a number called the stratum, with the reference level (primary servers) assigned as one and each succeeding level towards the leaves (secondary servers) assigned as one greater than the preceding level. Section III.B paragraph 3: Symmetric passive mode is designed for use by servers operating near the root (low stratum levels) and with a relatively large number of peers on an possibly intermittent basis ].

8. Regarding to claim 21, Mills discloses a timing component providing a reference time, the timing component comprising:

a first bound limit indicating an earliest time at which the reference time is determined to have possibly occurred, wherein the first bound limit is based on a transmittal time at which a protected reference time request was transmitted to a higher level computing device, the higher level computing device being a level closer to a reference time source [Figure 3 "Measuring Delay and Offset", Ti-3 ] ; and

a second bound limit indicating a latest time at which the reference time is determined to have possibility occurred, wherein the second bound limit is based on a receipt time at which a response was received from the higher level computing device, the response comprising the reference time and a protected [Figure 3 "Measuring Delay and Offset", Ti-2].

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mills as applied to claim 2 above, and in view of Micali (US 6,097,811), hereinafter referred to as Micali.

11. Regarding to claim 15, Mills does not disclose using a Merkle tree algorithm. However, Micali shows how Merkle's scheme can yield certificate revocation systems more efficient than known CRL-based (certified revocation lists) systems [col. 3, line 63 – col. 4, line 3]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Micali into Mills' system to structure the response from the higher level computing device in accordance with a Merkle tree algorithm. The motivation would be to have more efficient cryptographic mechanism.

***Allowable Subject Matter***

12. Claims 8-11 and 17-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Mills and Micali do not disclose: postponing until a predetermined number of protected reference time requests are received from lower level computing devices

Art Unit: 2143

(claims 8, 17); transmitting at pre-scheduled times (claims 9, 18); at least two higher level computing devices (claims 10, 19); steps of: determining a rate of change of a system time with respect to the reference time; and setting the first bound limit and the second bound limit to account for the determined rate of change (claims 11, 20).

### ***Remarks***

14. The following pertaining arts are discovered and not used in this office action.

Office reserves the right to use these arts in later actions.

- Strong, et al. (US 5,689,688) "Probabilistic anonymous clock synchronization method and apparatus for synchronizing a local time scale with a reference time scale"
- Bridge, et al. (US 6,125,368) "Fault-tolerant timestamp generation for multi-node parallel databases"

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C. Lai whose telephone number is (571) 270-3236. The examiner can normally be reached on M-F 7:30 - 5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on (571) 272-5026. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2143

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael C. Lai  
23AUG2007

  
MARVIN M. LATEEF  
SUPERVISORY PATENT EXAMINER